Published in final edited form as:

AIDS Care. 2017 May ; 29(5): 579–586. doi:10.1080/09540121.2016.1259455.

Post-exposure prophylaxis awareness and use among men who have sex with men in London who use geosocial-networking smartphone applications

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Abstract

The number of new HIV infections continues to be on the rise in many high-income countries, most notably among men who have sex with men (MSM). Despite recent attention to the use of antiretroviral medications as pre-exposure prophylaxis (PrEP) among MSM, considerably less research has been devoted to examining the awareness and use of post-exposure prophylaxis (PEP). Based on a convenience sample of 179 self-reported HIV-uninfected MSM using a geosocial-networking smartphone application, this study is among the first to examine the

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Disclosure statement

No potential conflict of interest was reported by the authors.

awareness and use of PEP and their demographic and behavioral correlates among MSM in London. Most respondents (88.3%) had heard of PEP, where 27.4% reported having used it. In multivariable models, the disclosure of one's sexual orientation to their general practitioner (Prevalence ratio [PR]: 3.49; 95% confidence interval (CI): 1.14, 10.70; $p = .029$) and reporting one's HIV status as negative (rather than unknown) (PR: 11.49; 95% CI: 1.68, 76.92; $p = .013$) were associated with having heard of PEP; while the recent use of club drugs (PR: 3.02; 95% CI: 1.42, 6.43; $p = .004$) was associated with having ever used PEP. High awareness and use in this sample suggest that PEP is a valuable risk-reduction strategy that should be capitalized on, be it in addition to or in the absence of PrEP.

Keywords

Men who have sex with men (MSM); post-exposure prophylaxis; United Kingdom; smartphone application

Introduction

HIV continues to be a threat and challenge to population health in many parts of the world (Beyrer & Karim, 2013). In Europe, the United Kingdom is among the most severely affected countries and continues to experience the highest HIV incidence rates of all larger European countries (European Centre for Disease Control and Prevention, 2015). As in many countries in Western and Central Europe, men who have sex with men (MSM) in the United Kingdom are not only disproportionately affected by HIV but represent the majority of new cases of HIV infection. While the total number of new HIV diagnoses in the United Kingdom has steadily decreased since the mid-2000s, 3360 MSM – more than ever – were diagnosed with HIV in 2014. It is estimated that 1 in 11 MSM in London are infected with HIV (Desai et al., 2015).

Significant progress in the development of antiretroviral drugs to suppress the virus has recently sparked considerable research and public interest in the use of such medication as pre-exposure prophylaxis (PrEP) among populations at high risk of becoming infected (Grant et al., 2010; McCormack et al., 2016; Molina et al., 2015). In the United Kingdom, despite demonstrated efficacy in a British trial (McCormack et al., 2016), the National Health System has decided not to provide PrEP. In these circumstances, it may be best to leverage all available prevention modalities, including post-exposure prophylaxis (PEP). In order for this regimen of antiretroviral medications to be effective, it must be started as soon as possible after a potentially high-risk exposure to HIV and continued for up to four weeks (Fisher et al., 2006). Current United Kingdom guidelines recommend the use of PEP after condomless receptive or insertive anal intercourse with a sexual partner who is known to be HIV positive or if the HIV status of this partner is unknown (Fisher et al., 2006). In the United Kingdom, PEP is accessible through sexual health clinics and the accident and emergency departments of some hospitals and is available free of charge (Whitlock, McCormack, Fearnley, & McOwan, 2016).

Geosocial-networking smartphone applications (hereby referred to as “apps”) represent an increasingly common virtual context in which MSM meet their sexual partners (Phillips II et

al., 2014), and one in which sexual encounters may occur quickly without discussion of HIV status or sexual history (Newcomb, Mongrella, Weis, McMillen, & Mustanski, 2016). Popular apps directed at MSM (e.g., Grindr, Jack'd, and Scruff) allow users to post pictures and brief descriptions of themselves, locate other users based on their physical proximity to one another, and chat with potential connections. The ubiquity of Grindr, which reported that it had two million daily users in nearly 200 countries in 2013 (Rendina, Jimenez, Grov, Ventuneac, & Parsons, 2014) with its highest number of users in the world being located in London (Grindr, 2015), and this and other similar apps present a new opportunity to study sexual-risk behaviors. MSM who use apps may often engage in high-risk behaviors where PEP use may be a suitable prevention strategy. To our knowledge, no prior studies have examined the awareness and use of PEP among MSM in the United Kingdom who use these apps to meet sexual partners. Therefore, the purpose of this study was to determine the prevalence of PEP awareness and use as well as to identify their demographic and behavioral correlates.

Methods

Sample recruitment

The aims and recruitment methods for this study have been described previously (Duncan et al., 2016). In brief, broadcast advertisements were placed on a popular geosocial-networking smartphone app over the course of four non-consecutive 24-h periods in January 2016. Users were shown this advertisement the first time they logged into the application during a given 24-h period. In line with previous research recruiting from geosocial-networking smartphone applications (Beymer, Rossi, & Shu, 2016; Goedel, Halkitis, Greene, Hickson, & Duncan, 2016), the “Prevent Ballot Box Stuffing” feature on Qualtrics was utilized to prevent users from accessing the survey multiple times on the same device. Following the data collection period, responses were reviewed to detect duplicate responses, but none were apparent. All protocols were approved via institutional review prior to data collection.

Measures

PEP awareness and use—Respondents were first shown the following introductory statement: “Post-exposure prophylaxis, sometimes referred to as PEP, is a medication that can be taken after a potential exposure to HIV by an HIV-negative person to protect against HIV”. Awareness was assessed with an item reading “Have you ever heard of post-exposure prophylaxis or PEP?” and use was assessed with an item reading “Have you ever taken post-exposure prophylaxis or PEP?” These items had two response options (yes, no). To avoid potential confusion with pre-exposure prophylaxis (PrEP), the following description was also given: “Pre-exposure prophylaxis, sometimes referred to as PrEP or by the brand name Truvada, is a new prescription medication that can be taken daily by an HIV-negative person to protect against HIV”.

HIV status, HIV testing, and sexually transmitted infections—HIV status was self-reported as positive, negative, or unknown/never tested. Individuals were asked to report how long it had been since their last HIV testing (less than 3 months, 3–6 months, 6–12 months, more than 12 months, and never been tested). This variable was then dichotomized

to indicate whether or not an individual had been tested for HIV in the preceding year. Participants' self-reported diagnoses with gonorrhea, chlamydia, or syphilis in the preceding year to create a composite variable indicating a diagnosis with any sexually transmitted infection (STI) in the preceding year.

Health care utilization and experiences—Individuals were asked to report how long it had been since their last appointment with a doctor or health care professional (less than 6 months, 6–12 months, 1–2 years, 2–5 years, and more than 5 years). This variable was then dichotomized to indicate whether or not an individual had seen a doctor or health care professional in the preceding year. Individuals were also asked if they had ever been denied health care on the basis of their sexual orientation or their sexual activity with other men (yes, no), been afraid to seek health care because of their sexual orientation or their sexual activity with other men (yes, no), or disclosed their sexual orientation or their sexual activity with other men to a doctor or health care provider (yes, no).

Sexual behaviors, substance use, and mental health—First, participants reported the total number of partners with whom they had engaged in receptive and insertive anal intercourse in the preceding 3 months. Participants then provided the number of partners with whom they had engaged in each of these behaviors without a condom. Each of these four variables was dichotomized to represent engagement in the behavior with one or more partners or no engagement in the behavior (0 partners).

Participants selected from a list of substances, which included alcohol (≥ 5 drinks in one sitting), cocaine, ecstasy, gamma hydroxybutyrate (GHB)/gamma butyrolactone (GBL), heroin, inhalant nitrites, ketamine, lysergic acid diethylamide (LSD), marijuana, and methamphetamine, to indicate any substance use in the preceding 3 months. All substances were considered individually and a composite variable for club drug use was created based on the use of ecstasy, GHB/GBL, ketamine, or LSD in the preceding 3 months. Substance use was assessed globally (e.g., any use in the recall period vs. no use in the recall period) rather than situationally (e.g., any use before or during sexual activity).

The self-reported presence of depressive symptoms was assessed using the Patient Health Questionnaire-2, a reliable and validated screening tool for depressive symptoms (Löwe, Kroenke, & Gräfe, 2005). A dichotomous variable was created to indicate the absence (score: < 3) or presence (score: ≥ 3) of self-reported depressive symptoms.

Demographic covariates—Age was measured continuously in years and categorized as 18–24 years, 25–30 years, 31–40 years, 41–50 years, and 51 years and older. Sexual orientation was categorized as gay, bisexual, straight, and other. In accordance with the UK Census for England and Wales, ethnicities were categorized as White or White British, Black or Black British, Asian or Asian British, and mixed/multiple ethnic groups/other. Employment status was categorized as employed, unemployed, retired, or enrolled as a student. Relationship status was categorized as currently being in a relationship with another man or not.

Data analysis

Descriptive statistics were computed for all variables. Bivariable associations between PEP awareness and use and all demographic and behavioral variables were assessed using chi-square tests of independence. Subsequently, two separate log-binomial regression models were fit for PEP awareness and used as the outcome variables, first including all variables with bivariable associations with p values less than .20 and then eliminated using a manual stepwise method until all correlates had a p value less than .10. While the most common method of modeling binomial outcomes is binomial logistic regression, the odds ratios derived from these models may overestimate the prevalence ratios (PRs) when working with non-rare outcomes (Barros & Hirakata, 2003). Continuous variables were transformed into categorical variables as describe above to be used in multivariable. Significance was determined by 95% confidence intervals (CIs) and $p < .05$.

Results

Sample demographics

Throughout the recruitment period, 1410 users clicked through the advertisement and reached the landing page of the survey, and 202 users provided informed consent and completed the survey (14.3%). Given that PEP represents an HIV prevention strategy, 23 participants self-reporting their HIV status as positive were excluded, restricting the analytical sample to 179 participants. The demographics of the analytical sample ($n = 179$) are presented in Table 1. Two-fifths of respondents (42.5%) were aged between 18 and 30 years. Most (97.8%) described themselves as gay or bisexual. Almost three-fourths (72%) of the respondents identified their ethnic group themselves to be White. Most (87.1%) were currently employed or enrolled as a student. Almost one-fifth (17.9%) reported being in a relationship with a man.

Sexual behaviors, substance use, and mental health

Descriptive statistics related to sexual behaviors, substance use, and mental health are reported in Table 1. Most participants (73.7%) engaged in insertive anal intercourse in the preceding 3 months with one or more partners, with a median of 2.0 partners (interquartile range [IQR] = 4.0). About two-fifths of participants (42.5%) engaged in insertive anal intercourse without a condom with one or more partners in the preceding 3 months, with a median of 0 partners (IQR = 1.0). About two-thirds of participants (64.8%) engaged in receptive anal intercourse in the preceding 3 months, with a median of 1.0 partners (IQR = 3.0). About two-fifths of participants (34.6%) engaged in condomless receptive anal intercourse with one or more partners, with a median of 0 partners (IQR = 1.0). In the preceding 3 months, 39.7% of participants had on at least one occasion had five or more drinks containing alcohol in one sitting. The most commonly used substances among respondents were inhalant nitrites or “poppers” (35.2%), club drugs (22.3%), marijuana (21.2%), cocaine (14.5%), and methamphetamine (11.7%). The prevalence of depressive symptoms assessed via self-report was 22.3%.

HIV status, HIV testing, and STIs

Most (94.4%) reported their HIV status as negative; 5.6% reported their HIV status as unknown or that they had never been tested for HIV. A large majority (86.0%) had been tested for HIV in the past year. Less than one-third (28.5%) reported having been diagnosed or treated for gonorrhea, chlamydia, or syphilis in the preceding year.

Health care utilization and experiences

Most (86.6%) reported having seen a doctor or health care professional in the preceding year. A small percentage (3.9%) reported having ever been denied health care on the basis of their sexual orientation or their sexual activity with other men. One-fourth (25.7%) reported having ever been afraid to seek health care services because of their sexual orientation or their sexual activity with other men. About three-fourths (78.8%) reported having disclosed their sexual orientation or their sexual activity with other men to a doctor or health care provider.

PEP awareness and use

Most respondents (88.3%) had reported ever hearing about PEP. Although significant at the bivariable level, associations between PEP awareness and age, ethnic group membership, club drug use, having been tested for HIV in the past year, recent STI diagnoses, and having seen a doctor in the preceding year did not persist in regression models. In bivariable and multivariable models, the disclosure of one's sexual orientation to their general practitioner (PR: 3.73; 95% CI: 1.16, 10.41; $p = .029$) and reporting one's HIV status as negative (rather than unknown) (adjusted prevalence ratio [aPR]: 6.85; 95% CI: 1.31, 35.71; $p = .013$) were associated with having heard of PEP.

About one-quarter of participants (27.4%) reported having ever used PEP. Although significant at the bivariable level, associations between past PEP use and club drug use, having been tested for HIV in the past year, and recent STI diagnoses did not persist in regression models. In bivariable and multivariable models, recent methamphetamine use (aPR: 3.42; 95% CI: 1.29, 9.10; $p = .004$) and currently being in a relationship with another man (aPR: 0.14; 95% CI: 0.032, 0.640; $p = .017$) were associated with PEP use.

Discussion

Our analyses revealed that 88.3% of respondents had heard of PEP and 27.4% had ever taken PEP. These findings contribute to the relatively small body of literature on PEP awareness and use among MSM including identifying their demographic and behavioral correlates. Awareness of PEP (88.3%) was higher than expected based on previous research. In samples of HIV-negative MSM in the United States, awareness of PEP has ranged from 41.0% (Dolezal et al., 2015) to 47.0% (Liu et al., 2008). This level of awareness is also higher than those observed in samples of MSM in Australia (Zablotska et al., 2011), Canada (Lin et al., 2016), Italy (Prati et al., 2016), and Spain (Fernández-Balbuena et al., 2013). However, the association between the disclosure of one's sexual orientation to physician and awareness of PEP is supported by previous literature (Mehta et al., 2011). Reporting one's HIV status as unknown (rather than negative) was associated with being unaware of PEP,

highlighting the importance of regular HIV testing and counseling to discuss various risk-reduction strategies.

The reported past use of PEP in one's lifetime (27.4%) was also higher than expected based on previous research. In the United States, use of PEP has ranged from 1.3% (Dolezal et al., 2015) to 4.0% (Liu et al., 2008). Reported PEP use has been less than 5.0% in samples in Spain (Fernández-Balbuena et al., 2013), Canada (Lin et al., 2016), and Australia (Zablotska et al., 2011). Reporting a current relationship with another man was associated with PEP non-use. This association may reflect condom use decisions based on the monogamous nature of some of these relationships or based on agreements regarding condom use with non-main partners in consensual non-monogamous relationships. The association between recent illicit drug use and PEP use is supported by previous literature (Donnell et al., 2010). The use of methamphetamine in particular may be associated with "chemsex", a phenomenon among MSM in the United Kingdom where individuals have intentional sex under the influence of psychoactive drugs (McCall, Adams, Mason, & Willis, 2015). Given that these drugs may inhibit one's ability to discuss HIV status and testing and negotiate condom use, it is possible that these individuals are engaged in behaviors that increase their potential exposure to HIV and their need for PEP.

PEP communication strategies have, in the past, managed to dramatically increase awareness of PEP among local MSM communities (Minas, Laing, Jordan, & Mak, 2012); it is possible that such targeted campaigns that were conducted in the United Kingdom have had a similarly positive impact (Roedling et al., 2008). Likewise, it is plausible that a public, universal health care system facilitates both the flow of relevant information and the utilization of services such as PEP when needed. Cross-sectional and longitudinal studies on points of access for PEP, physician training and attitudes, and patient follow-up would be required in order to answer these questions appropriately. Moreover, our results underscore the importance for MSM to be able to disclose their sexuality to their health care provider. Efforts to improve health care for sexual minority patients should be maintained or reinforced, respectively. In particular, MSM should be encouraged to be tested for HIV and other STIs at least once a year as based on current recommendations, as our results show that knowing one's HIV status is associated with being aware of PEP, suggesting that these clinical encounters, especially in settings where PEP is provided, can be important points of delivery of new information to at risk individuals. However, given that PEP use may not be completely effective because it is highly dependent on timing of regimen initiation and adherence (Irvine et al., 2015) and does not protect against STIs, educational campaigns on this prevention method should also include information regarding other risk-reduction practices.

This study has limitations. With a relatively small sample ($n = 179$) recruited from a single geosocial-networking application for MSM, it is likely that results are not generalizable to the entire MSM population in London, let alone other cities in Europe and beyond. Moreover, a high percentage of individuals (85.7%) who saw the advertisement and clicked on it chose not to complete the survey, indicating a high likelihood of bias due to self-selection. Additionally, self-reported measures such as HIV testing frequency may be subject to recall and reporting bias; however, as respondents participated in this study

anonymously using their own smartphone, reporting bias is unlikely to be substantial. However, the study contributes novel descriptive and analytical information on the knowledge and uptake of PEP in this at-risk population.

Conclusion

High awareness and use in this sample suggest that PEP is a valuable risk-reduction strategy that should be capitalized on following potential exposures to HIV among MSM in the United Kingdom. Initiatives to increase patient comfort in disclosing their sexual orientation to their general practitioner may further increase awareness and uptake of PEP and other HIV prevention treatments and overall improvements in the health of MSM.

Acknowledgments

The authors thank Noah Kreski for conducting background literature reviews for this manuscript.

Funding

This work was supported by the New York University College of Arts and Science Dean's Undergraduate Research Fund (Principal Investigator: William C. Goedel) and Dr Dustin Duncan's New York University School of Medicine Start-Up Research Fund. Daniel Hagen was supported by a doctoral fellowship from the New York University College of Global Public Health. Dr Dustin Duncan was supported by a New York University School of Medicine Start-Up Research Fund to work on this project.

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Table 1

Demographic and behavioral correlates of awareness and use of PEP among MSM who use geosocial-networking smartphone applications in London ($n = 179$).

	Awareness of PEP				Use of PEP			
	Overall (% [n])	Aware (% [n]) $n = 158$	Unaware (% [n]) $n = 21$	Univariate association (PR [95% CI])	Multivariate association (PR [95% CI])	Use (% [n]) $n = 49$	Non-use (% [n]) $n = 130$	Multivariate association (PR [95% CI])
Age				$p = .018$				$p = .497$
18–24 years	16.8 (30)	76.7 (23)	23.3 (7)			20.0 (6)	80.0 (24)	
25–30 years	25.7 (46)	93.5 (43)	6.5 (3)	1.219 (0.987, 1.507)		30.4 (14)	69.6 (32)	1.522 (0.658, 3.520)
31–40 years old	30.7 (55)	81.8 (45)	18.2 (10)	1.067 (0.845, 1.348)		27.3 (15)	72.7 (40)	1.364 (0.591, 3.145)
41–50 years	16.8 (30)	100.0 (30)		1.304 (1.071, 1.589)		36.7 (11)	63.3 (19)	1.833 (0.779, 4.317)
51 years and older		94.4 (17)	5.6 (1)	1.232 (0.982, 1.46)		16.7 (3)	83.3 (15)	0.833 (0.237, 2.928)
Sexual orientation				$p = .581$				$p = .493$
Gay	87.2 (156)	89.1 (139)	10.9 (17)			27.6 (43)	72.4 (113)	
Bisexual	10.6 (19)	84.2 (16)	15.8 (3)	0.945 (0.772, 1.157)		21.1 (4)	78.9 (15)	0.764 (0.308, 1.892)
Other	2.2 (4)	75.0 (3)	25.0 (1)	0.842 (0.477, 1.486)		50.0 (2)	50.0 (2)	1.814 (0.659, 4.993)
Race/ethnicity				$p = .033$				$p = .163$
White or White British	71.5 (128)	89.8 (115)	10.2 (13)			25.8 (33)	74.2 (95)	
Black or Black British	5.6 (10)	70.0 (7)	30.0 (3)	0.779 (0.517, 1.174)		10.0 (1)	90.0 (9)	0.388 (0.059, 2.548)
Asian or Asian British	7.8 (14)	71.4 (10)	28.6 (4)	0.795 (0.568, 1.113)		28.6 (4)	71.4 (10)	1.108 (0.460, 2.669)
Mixed, multiple, or other	14.0 (25)	96.0 (24)	4.0 (1)	1.069 (0.968, 1.180)		44.0 (11)	56.0 (14)	1.707 (1.004, 2.902)
Employment status				$p = .707$				$p = .604$
Employed	74.3 (133)	88.7 (118)	11.2 (15)			26.3 (35)	73.7 (98)	
Unemployed	9.5 (17)	88.2 (15)	11.8 (2)	0.995 (0.827, 1.195)		41.2 (7)	58.8 (10)	1.565 (0.829, 2.954)
Student	12.8 (23)	82.6 (19)	17.4 (4)	0.931 (0.765, 1.134)		26.1 (6)	73.9 (17)	0.991 (0.471, 2.087)
Retired	2.8 (5)	100.0 (5)		1.127 (1.061, 1.198)		20.0 (1)	80.0 (4)	0.760 (0.129, 4.489)
Current relationship				$p = .221$				$p = .002$
No	82.1 (147)	89.8 (132)	10.2 (15)			32.0 (47)	68.0 (100)	
Yes	17.9 (32)	81.3 (26)	18.7 (6)	0.905 (0.759, 1.078)		6.3 (2)	93.8 (30)	0.195 (0.050, 0.764)
Condomless insertive anal				$p = .355$				$p = .612$
								0.144 * (0.032, 0.640)

	Awareness of PEP				Use of PEP		
	Overall (% [n])	Aware (% [n]) n = 158	Unaware (% [n]) n = 21	Univariate association (PR [95% CI])	Multivariate association (PR [95% CI])	Use (% [n]) n = 49	Non-use (% [n]) n = 130
0 partners in past 3 months	57.5 (103)	90.3 (93)	9.7 (10)			29.1 (30)	70.9 (73)
1 + partners in past 3 months	42.5 (76)	85.5 (65)	14.5 (11)	0.947 (0.847, 1.060)		25.0 (19)	75.0 (57)
Condomless receptive anal							
0 partners in past 3 months	65.4 (117)	91.5 (107)	8.5 (10)	<i>p</i> = .088			<i>p</i> = .295
1 + partners in past 3 months	34.6 (62)	82.3 (51)	17.7 (11)	0.899 (0.791, 1.022)	0.290* (0.094, 0.893)	29.0 (18)	1.358 (0.792, 2.327)
Alcohol use							
No use in past 3 months	60.3 (108)	88.0 (95)	12.0 (13)	<i>p</i> = .999		25.9 (28)	74.1 (80)
Any use in past 3 months	39.7 (71)	88.7 (63)	11.3 (8)	1.009 (0.905, 1.124)		29.6 (21)	70.4 (50)
Club drug use							<i>p</i> = .002
No use in past 3 months	77.7 (139)	85.6 (119)	14.4 (20)	<i>p</i> = .049		21.6 (30)	78.4 (109)
Any use in past 3 months	22.3 (40)	97.5 (39)	2.5 (1)	1.139 (1.047, 1.239)	9.279 (0.892, 96.571)	47.5 (19)	52.5 (21)
Cocaine use							<i>p</i> = .233
No use in past 3 months	85.5 (153)	86.9 (133)	13.1 (20)	<i>p</i> = .319		25.5 (39)	74.5 (114)
Any use in past 3 months	14.5 (26)	96.2 (25)	3.8 (1)	1.106 (1.022, 1.221)		61.5 (16)	38.5 (10)
Marijuana use							<i>p</i> = .309
No use in past 3 months	78.8 (141)	87.2 (123)	12.8 (18)	<i>p</i> = .573		25.5 (36)	74.5 (105)
Any use in past 3 months	21.2 (38)	92.1 (35)	7.9 (3)	1.056 (0.944, 1.182)		34.2 (13)	65.8 (25)
Methamphetamine use							<i>p</i> = .003
No use in past 3 months	88.3 (158)	86.7 (137)	13.3 (21)	<i>p</i> = .140		23.4 (37)	76.6 (121)
Any use in past 3 months	11.7 (21)	100.0 (21)		1.153 (1.085, 1.226)		57.1 (12)	42.9 (9)
Nitrite inhaler use							
No use in past 3 months	64.8 (116)	87.9 (102)	12.1 (14)	<i>p</i> = .999		23.3 (27)	76.7 (89)
Any use in past 3 months	35.2 (63)	88.9 (56)	11.1 (7)	1.011 (0.905, 1.129)		34.9 (22)	65.1 (41)
Depressive symptoms							<i>p</i> = .111
Absent in past 2 weeks	77.6 (139)	89.9 (125)	10.1 (14)	<i>p</i> = .262		24.5 (34)	75.5 (105)
Present in past 2 weeks	22.3 (40)	82.5 (33)	17.5 (7)	0.917 (0.787, 1.069)		37.5 (15)	62.5 (25)
HIV status				<i>p</i> < .001			<i>p</i> = .289
							3.423** (1.288, 9.100)

	Awareness of PEP					Use of PEP			
	Overall (% [n])	Aware (% [n]) n = 158	Unaware (% [n]) n = 21	Univariate association (PR [95% CI])	Multivariate association (PR [95% CI])	Use (% [n]) n = 49	Non-use (% [n]) n = 130	Univariate association (PR [95% CI])	Multivariate association (PR [95% CI])
Negative	94.4 (169)	91.1 (154)	8.9 (15)			28.4 (48)	71.6 (121)		
Unknown/never tested	5.6 (10)	60.0 (6)	40.0 (4)	0.658 (0.396, 1.095)	0.146* (0.028, 0.761)	10.0 (1)	90.0 (9)	0.352 (0.054, 2.295)	
Tested for HIV in past year				p = .003				p = .017	
No	14.0 (25)	68.0 (17)	32.0 (8)			8.0 (2)	92.0 (23)		
Yes	86.0 (154)	91.6 (141)	8.4 (13)	1.346 (1.025, 1.769)		30.5 (47)	69.5 (107)	3.815 (0.988, 14.724)	4.329 (0.958, 19.575)
Recent STI diagnoses				p = .042				p = .040	
No diagnosis	71.5 (128)	85.2 (109)	14.8 (19)			22.7 (29)	77.3 (99)		
Any diagnosis	28.5 (51)	96.1 (49)	3.9 (2)	1.128 (1.030, 1.236)	4.149 (0.775, 22.195)	39.2 (20)	60.8 (31)	1.731 (1.084, 2.764)	
Visited doctor in past year				p = .042				p = .810	
No	13.4 (24)	75.0 (18)	25.0 (6)			29.2 (7)	70.8 (17)		
Yes	86.6 (155)	90.3 (140)	9.7 (15)	1.204 (0.950, 1.526)		27.1 (42)	72.9 (113)	0.929 (0.473, 1.824)	
Denied health care				p = .411				p = .090	
No	96.1 (172)	87.8 (151)	12.2 (21)			27.2 (45)	73.8 (127)		
Yes	3.9 (7)	100.0 (7)		1.139 (1.077, 1.204)		42.9 (3)	57.1 (4)	1.638 (0.672, 3.995)	
Afraid to seek health care				p = .187				p = .701	
No	74.3 (133)	90.2 (120)	9.8 (13)			28.6 (38)	71.4 (95)		
Yes	25.7 (46)	82.6 (38)	17.4 (8)	0.916 (0.793, 1.057)		23.9 (11)	76.1 (35)	0.837 (0.468, 1.497)	
Disclosed sexual orientation				p = .001				p = .414	
No	21.2 (38)	71.1 (27)	28.9 (11)			21.1 (8)	78.9 (30)		
Yes	78.8 (141)	92.9 (131)	7.1 (10)	1.308 (1.062, 1.610)	3.473* (1.159, 10.409)	29.1 (41)	70.9 (100)	1.381 (0.709, 2.692)	

* $p < .05$;** $p < .01$.